

THE TAXONOMY OF THE NEARCTIC SPECIES OF THE GENUS  
*BYRRHUS* LINNAEUS (COLEOPTERA: BYRRHIDAE)

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*On the basis of a study of external characteristics and male genitalia, the taxonomy of the Nearctic species of Byrrhus is reviewed. Seven species, named as follows, are recognized: americanus LeConte; cyclophorus Kirby; geminatus LeConte; fasciatus Forster; eximius LeConte; kirbyi LeConte; and concolor Kirby. Twenty three species-group names are placed in synonymy. Relationships of the species are briefly considered.*

The present study is the first of a series dealing with a taxonomic revision of the genera and species of Nearctic Byrrhidae. This study started many years ago at the Department of Entomology, University of Alberta, and was suggested by George E. Ball. The type specimens available in North America were studied in the summer of 1959, on a trip financed by a National Research Council of Canada grant (A-1399) held by Ball. A tentative classification and a key to the genera of this family was published by me in 1961.

MATERIALS AND METHODS

The material examined consisted of 1100 specimens borrowed from the major entomological collections in the United States and Canada. Type specimens examined are in the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZ), in the Smithsonian Institution, Washington, D. C. (USNM), and in the British Museum, Natural History (BMNH).

My interpretation of the Kirby, Horn, and Forster names is based on study of the original descriptions and on specimens identified by LeConte. Ball examined the Kirby types. He informed me (*in litt.*) that they were badly rubbed females, and thus could not be positively identified.

All of the specimens available were examined for details of vestiture, body markings, and structure of various sclerites, especially the male genitalia. To relax specimens for dissection, they were placed for several hours in an atmosphere of ammonium hydroxide. The male genitalia were removed and cleared in a 10 per cent solution of potassium hydroxide.

To make drawings, the dissected parts were photographed through a Russian stereo binocular microscope, model MBS-2. The outlines were traced with ink on the photographic prints, and the latter were reproduced as one-tone pictures. Magnifications of the drawings were obtained by means of stage and ocular micrometers.

Genus *Byrrhus* Linnaeus, 1767

*Type species.* — *Byrrhus pilula* Linnaeus, 1758

*Description.* — Body form oval, convex. Length 6.0 - 12.0 mm, width 3.5 - 6.0 mm. Color black or dark brown; elytra with dark or dirty gray stripes or pale grayish spots, more or less characteristic of each species. Integument covered with simple hairs. Antennae (Fig. 1) clavate, from dorsal view exposed in resting position; each antenna of 11 articles, article 3 narrow, elongate, following articles widened. Eyes partly hidden with head in resting position. Mouthparts, except labrum, hidden. Labrum (Fig. 2) heavily sclerotized. semi-circular or triangular in shape. Mandibles (Fig. 3) multidentate at extremities each with internal notch toward middle, and with ciliated leathery lamella. Maxillae (Fig. 4) each with

galea densely setose at extremity, lacinia narrower, shorter, densely setose at extremity and on inner margin. Maxillary palpus with first article narrow, small; second and third articles subequal; terminal article noticeably long, gradually dilated toward apex. Mentum (Fig. 5) short, transverse, notched-sinuate anteriorly. Ligula large, divided by incision in middle, each lobe subcircular apically and densely setose. Labial palpus with first article narrow, second setose, terminal article large and dilated apically.

Legs (Fig. 6, 7 and 8) each with tibia enlarged toward apex; middle tibia strongly arched and dentate on dorsal side. Tarsi in resting position, each received in depression on internal face of tibia; each article with setae ventrally; first article much longer than articles 2 - 4; article 5 very long. Male with claws of anterior tarsus large and strongly curved.

Elytra with intervals flat, striae shallowly impressed. Vestiture dense, patterned, with paler scales in form of central transverse mark, extended each side from suture to beyond mid line of each elytron; and four rows of longitudinally arranged tufts (vittae) of more prominent scales in intervals 2, 4, 6 and 8, extended from base to apical three fourths of each elytron.

Wings normally fully developed, venation as in Fig. 9, brachyptery rare.

Abdomen (Fig. 10) with crural depressions (grooves in first sternum for reception of hind femora) large, occupying more than half sternum 1.

*Remarks.* — The Leng catalogue (1920) lists the names of 30 species-group taxa under the generic name *Byrrhus*. However, because of synonymies proposed below, only seven species should now be recorded from North America.

#### Key to the Nearctic species of the genus *Byrrhus* Linnaeus

1. Margins of elytra, hind coxae and abdominal sterna with stout, blunt bristles; median lobe and parameres almost twice length of basal piece (Fig. 11), median lobe broad, tapered toward apex, parameres markedly narrowed at distal one fourth of length . . . . . *americanus* LeConte, p. 329.
- Margins of elytra, hind coxae and abdominal sterna without blunt bristles; male genitalia various . . . . . 2.
2. (1). Central transverse mark of elytra with cinereous spot near center; antennae and legs stout; median lobe of male genitalia narrowed at middle, enlarged near apex and pointed; parameres broad at base, strongly narrowed toward apices (Fig. 15) . . . . . *eximius* LeConte, p. 331.
- Central transverse mark without cinereous spot at center . . . . . 3.
3. (2). Elytron in apical one fourth with large black spot extended from near lateral margin to near mid line; median lobe tapered toward apex; parameres each with apex slightly curved laterally (Fig. 16) . . . . . *kirbyi* LeConte, p. 331.
- Markings of dorsal surface otherwise . . . . . 4.
4. (3). Central transverse mark of elytra represented by two lines, posterior one strongly concave anteriorly; median lobe narrow, parameres narrowed gradually from bases, each acuminate apically (Fig. 13) . . . . . *geminatus* LeConte, p. 330.
- Markings of dorsal surface otherwise . . . . . 5.
5. (4). Parameres of male genitalia with apices rounded, median lobe with apex bluntly pointed (Fig. 12) . . . . . *cyclophorus* Kirby, p. 329;
- Parameres with apices acuminate, apex of median lobe various . . . . . 6.
6. (5). Median lobe with apex broadly rounded; parameres tapered more gradually (Fig. 14) . . . . . *fasciatus* Forster, p. 330.
- Median lobe with apex bluntly pointed; parameres abruptly narrowed close to apices (Fig. 17) . . . . . *concolor* Kirby, p. 332.

1. *Byrrhus americanus* LeConte

(Fig. 11 and 18)

*Byrrhus americanus* LeConte, 1850: 224. LECTOTYPE a female (here selected), collected at Lake Superior; first specimen of eight; paralectotypes three males and four females [MCZ].

*Byrrhus brunnescens* Casey, 1912: 21. HOLOTYPE female, collected at White Point; Casey bequest 1925; Type USNM 48332 [USNM]. NEW SYNONYMY.

*Byrrhus imperitus* Casey, 1912: 22. HOLOTYPE female, collected at West St. Modest, Labrador; Casey bequest 1925; Type USNM 48335 [USNM]. NEW SYNONYMY.

*Byrrhus angustulus* Casey, 1912: 22. HOLOTYPE female, collected at Aweme, Manitoba by Norman Criddle; Casey bequest 1925; Type USNM 48336 [USNM]. NEW SYNONYMY.

*Byrrhus angustulus neglectus* Casey, 1912: 22. LECTOTYPE (here selected) first of two specimens, collected in New Hampshire; Casey bequest 1925; Type USNM 48333 [USNM]; one paratype, sex not determined. NEW SYNONYMY.

*Byrrhus angustulus manitobae* Casey, 1912: 22. HOLOTYPE male, collected at Aweme, Manitoba by N. Criddle; Casey bequest 1925; Type USNM 48334 [USNM]. NEW SYNONYMY.

*Byrrhus criddlei* Casey, 1912: 24. LECTOTYPE (here selected), male, collected at Aweme, Manitoba, May 26, 1910; Casey bequest 1925; labelled as Type USNM 48339 [USNM]; one paratype, sex not determined [USNM] NEW SYNONYMY.

*Description.* — Total length 8.0 - 12.0 mm, width 5.0 - 6.0 mm. Labrum triangular. Vittae of elytral intervals 4, 6, and 8 in apical one fourth with patch of cinereous scales. Median lobe and parameres almost twice length of basal piece (Fig. 11). Median lobe broad, tapered toward apex; parameres markedly narrowed in distal one fourth of their length.

*Relationships.* — The marked similarity in form of the male genitalia shared by members of this species and *B. cyclophorus* suggests that these two species are closely related.

*Geographical distribution.* — This species is northern and transcontinental in distribution. It ranges from Labrador (West St. Modest) to interior Alaska (Eagle Summit) and the Pacific coast (Cannon Beach, Oregon). To the south, representatives of *americanus* have been collected in Pennsylvania, Colorado (Cumbres Pass), and in Oregon. See Fig. 18.

*Material examined.* — 494 specimens.

2. *Byrrhus cyclophorus* Kirby

(Fig. 12 and 19)

*Byrrhus cyclophorus* Kirby, 1837: 117. HOLOTYPE female, labelled as follows: Type [circular label, bordered in red]; N. Amer. [top], 5828 a [bottom, circular label, handwritten]; *Byrrhus cyclophorus* Kirby, N. Amer., 5828, Rev. Wm. Kirby [handwritten]. [BMNH].

*Byrrhus canterius* Casey, 1912: 27. LECTOTYPE (here selected) male, collected at Leadville, Colorado, 11,000', July 14, 1896, by Wickham; Casey bequest 1925; Type USNM 48348 [USNM]. One paratype. NEW SYNONYMY.

*Byrrhus fulvovestitus* Casey, 1912: 27. LECTOTYPE (here selected) female, collected in Oregon; Casey bequest 1925; Type USNM 48344 [USNM]. One paratype. NEW SYNONYMY.

*Description.* — Total length 6.5 - 8.0 mm, width 3.5 - 4.0 mm. Labrum triangular. Markings on elytra as in *B. americanus* specimens, but less transverse and outer black vitta represented by two or three obscure small spots. Male genitalia with median lobe and para-

meres twice as long as basal piece (Fig. 12). Median lobe constricted near middle, enlarged gradually toward apex, narrowed at extreme tip. Parameres each tapered gradually from base to apex and slightly curved toward median lobe.

*Relationships.* — Probably the specimens of this species are closely related to those of *B. americanus*, on the basis of overall similarity, including form of the male genitalia.

*Geographical distribution.* — This species is confined to the west, ranging from Oregon to eastern Alberta (Medicine Hat), north to northern Alberta (Beaverlodge) and south in the Rocky Mountains to central Colorado. See Fig. 19.

*Material examined.* — 22 specimens.

### 3. *Byrrhus geminatus* LeConte

(Fig. 13 and 20)

*Byrrhus geminatus* LeConte, 1854: 114. LECTOTYPE (here selected) female, collected at Lake Superior; Casey bequest 1925; Type 2297 [MCZ] and four paratypes [MCZ].

*Byrrhus pettiti* Horn, 1870: 76 (type material not seen). NEW SYNONYMY.

*Byrrhus concolor pacificus* Casey, 1912: 23. HOLOTYPE male, collected in "Washington Territory"; Casey bequest, 1925; Type USNM 48337 [USNM].

*Description.* — Total length 8.0 - 10.0 mm, width 5.0 - 6.0 mm. Central transverse mark of elytra represented by two lines of cinereous scales: posterior line strongly concave anteriorly. Male genitalia with median lobe and parameres about 1.5 times length of basal piece (Fig. 13). Median lobe very narrow. Parameres each narrowed gradually from base toward acuminate apex.

*Relationships.* — The form of the median lobe suggests that this species does not have any close relatives, at least in North America.

*Geographical distribution.* — This species is represented in eastern and western North America, but not in the northern mid-continental areas. In the east, specimens of this species are found from Minnesota eastward to New York (Mt. Marcy), and from western Quebec (Duparquet) southward to North Carolina (Mt. Mitchell). The western part of the range extends from the Rocky Mountains to the Pacific Coast (Cannon Beach, Oregon), northward to central Alaska (Mt. McKinley) and southward to southern Wyoming (Laramie). See Fig. 20.

*Material examined.* — 80 specimens.

### 4. *Byrrhus fasciatus* Forster

(Fig. 1 - 10, 14 and 21)

*Byrrhus fasciatus* Forster, 1771: 12. Type not seen.

*Byrrhus torpidus* Casey, 1912: 25. HOLOTYPE male, collected at Nain, Labrador; Casey bequest 1925; Type USNM 48340 [USNM]. NEW SYNONYMY.

*Byrrhus stolidus* Casey, 1912: 28. HOLOTYPE male, collected at Palouse, Washington; Casey bequest 1925; Type USNM 48345 [USNM]. NEW SYNONYMY.

*Byrrhus difficilis* Casey, 1912: 29. LECTOTYPE (here selected) male, collected on Mt. Washington, New Hampshire, 5000 - 6000'; Casey bequest 1925; Type USNM 48347 [USNM]. Two paratypes [USNM]. NEW SYNONYMY.

*Description.* — Total length 7.0 - 9.0 mm, width 4.0 - 5.0 mm. Body noticeably broadened posteriorly. Color black, brown or golden brown, with grayish-yellow or silvery-white hairs. Labrum triangular (Fig. 2). Male genitalia with median lobe and parameres about 1.5 times length of basal piece (Fig. 14). Median lobe lancet-shaped, evenly curved ventrally, apical

portion broad, apex broadly rounded. Parameres each gradually narrowed toward apex.

*Relationships.* — Similarities in the form of the median lobe and parameres shared by specimens of this species and those of *B. eximius* suggest a close relationship.

*Geographical distribution.* — The pattern of this Holarctic species in North America seems to be bi-centric, with specimens known from eastern and western North America, but not from mid-continental areas. The eastern segment of the range extends from Wisconsin (Bayfield) eastward to Labrador (Nain) and southward to the White Mountains of New Hampshire. The western segment of the range extends from the Rocky Mountains to the Pacific coast (Olympia, Washington), and from Nome, Alaska in the north to Loveland Pass in southern Colorado. See Fig. 21.

*Material examined.* — 70 specimens.

#### 5. *Byrrhus eximius* LeConte

(Fig. 15 and 22)

*Byrrhus eximius* LeConte, 1850: 224. HOLOTYPE female, collected at "Lake Superior"; LeConte Collection, Type 2298 [MCZ].

*Byrrhus callidus* Casey, 1912: 25. HOLOTYPE male, collected in Oregon; Casey bequest 1925; Type USNM 48341. [USNM]. NEW SYNONYMY.

*Byrrhus centralis* Casey, 1912: 27. HOLOTYPE female, collected in Idaho; Casey bequest 1925; Type USNM 48349 [USNM]. NEW SYNONYMY.

*Byrrhus explicatus* Casey, 1912: 27. HOLOTYPE female, collected in Leavenworth Valley, Colorado, 10,000 - 11,000'; Casey bequest 1925; Type USNM 48350 [USNM]. NEW SYNONYMY.

*Description.* — Total length 6.0 - 7.0 mm, width 3.5 - 4.0 mm. Central transverse mark of elytra with striking cinereous spot near center. Sterna covered with fine, decumbent hairs. Antennae and legs noticeably stout. Male genitalia with median lobe and parameres about 1.5 times length of basal piece (Fig. 15). Median lobe narrowed at middle, enlarged at apex. Parameres each broad at base, strongly narrowed toward apex.

*Relationships.* — The closest relative seems to be *B. fasciatus* Forster.

*Geographical distribution.* — Except for the type locality ("Lake Superior"), this species is known only from the west: eastern Alberta (Medicine Hat) to the Pacific coast (Prince Rupert, British Columbia and Port Angeles, Washington), and from Dawson City, Yukon Territory in the north to Mt. Lyell, California, and Loveland Pass, Colorado in the south. See Fig. 22.

*Material examined.* — 93 specimens.

#### 6. *Byrrhus kirbyi* LeConte

(Fig. 16 and 23)

*Byrrhus picipes* Kirby, 1837: 116 (not Duftschmid, 1825). HOLOTYPE female, labelled as follows: Type [circular label, bordered in red]; N. Amer. [top], 5826 a [bottom, circular label, handwritten]; *Byrrhus picipes* Kirby, N. Amer., 5826, Rev. W. Kirby (handwritten). [BMNH]. According to original description, collected at "Lat. 54".

*Byrrhus kirbyi* LeConte, 1854: 111.

*Byrrhus perditus* Casey, 1912: 24. LECTOTYPE female (here selected), collected in Oregon; Casey bequest 1925; Type USNM 48338 and four paratypes [USNM]. NEW SYNONYMY.

*Byrrhus egenus* Casey, 1912: 29. HOLOTYPE female, collected at Donald, British Columbia, by A. G. Smith; Casey bequest 1925; Type USNM 48346 [USNM]. NEW SYNONYMY.

*Byrrhus vafer* Casey, 1912: 30. HOLOTYPE male, collected at Leadville, Colorado 10,000 - 11,000', July 7 - 14, 1890, by H. F. Wickham; Casey bequest 1925; Type USNM 48351 [USNM]. NEW SYNONYMY.

*Byrrhus wickhami* Casey, 1912: 31. LECTOTYPE (here selected), male, collected in Idaho; Casey bequest 1925; Type USNM 48352 and three paratypes [USNM]. NEW SYNONYMY.

*Byrrhus consuetus* Casey, 1912: 31. HOLOTYPE female, collected at Aldermere, British Columbia; Casey bequest 1925; Type USNM 48353 [USNM].

*Description.* — Total length 7.0 - 8.5 mm, width 4.0 - 5.0 mm. Each elytron laterad of its mid line in apical one fourth with black spot formed by scales of vittae and additional ones on intervals between vittae. Labrum semicircular. Elytra broad, obtuse posteriorly. Male genitalia with median lobe and parameres about 1.5 times length of basal piece (Fig. 16). Median lobe broad, tapered toward bluntly pointed apex. Parameres each broad at base, tapered to apex, latter slightly curved laterad.

*Relationships.* — The similarities in form and proportions of the median lobe and parameres shared by members of this species and *B. concolor* suggest a close relationship.

*Geographical distribution.* — This species is transcontinental in the north, ranging from Labrador (West St. Modest) to the Commander and Pribilof Islands, north to northern Alaska (New Rampart House), south to central California, Colorado at high elevations, and southern New York (Rockaway Beach). See Fig. 23.

*Material examined.* — 280 specimens.

#### 7. *Byrrhus concolor* Kirby

(Fig. 17 and 24)

*Byrrhus concolor* Kirby, 1837. LECTOTYPE female (here selected), labelled as follows:

Type [circular piece of paper, bordered in red]; N. Amer [top], 5827 a [bottom of circular label, handwritten]; *Byrrhus concolor* Kirby, N. Amer 5827, Rev. W. Kirby [handwritten]. [BMNH]. According to original description, collected at "lat. 54".

*Byrrhus laramiensis* Casey, 1912: 26. LECTOTYPE (here selected), female, collected at Laramie, Wyoming by C. J. Wigwander; Casey bequest 1925; Type USNM 48342, and one male paratype [USNM]. NEW SYNONYMY.

*Byrrhus rigens* Casey, 1912: 26. LECTOTYPE (here selected), male, collected at Bayfield, Wisconsin, by H. F. Wickham; Casey bequest 1925; Type USNM 48343 and one paratype [USNM]. NEW SYNONYMY.

*Description.* — Total length 6.0 - 7.0 mm, width 3.5 - 4.0 mm. Markings of dorsal surface as in *B. americanus*. Labrum triangular. Male genitalia with median lobe and parameres about 1.5 times length of basal piece (Fig. 17). Median lobe constricted before apex, latter bluntly pointed. Parameres each broad basally, tapered gradually toward apex, latter obliquely subtruncate.

*Relationships.* — The members of this species are probably most closely related to those of *B. kirbyi*.

*Geographical distribution.* — This species is transcontinental in the north ranging from Nova Scotia (Kentville) and Ungava Bay, Quebec to southern Alaska (Matanuska). Southward, the range of this species extends to the Rocky Mountains of Colorado, and Pennsylvania (Pocono Lake). See Fig. 24.

*Material examined.* — 59 specimens.

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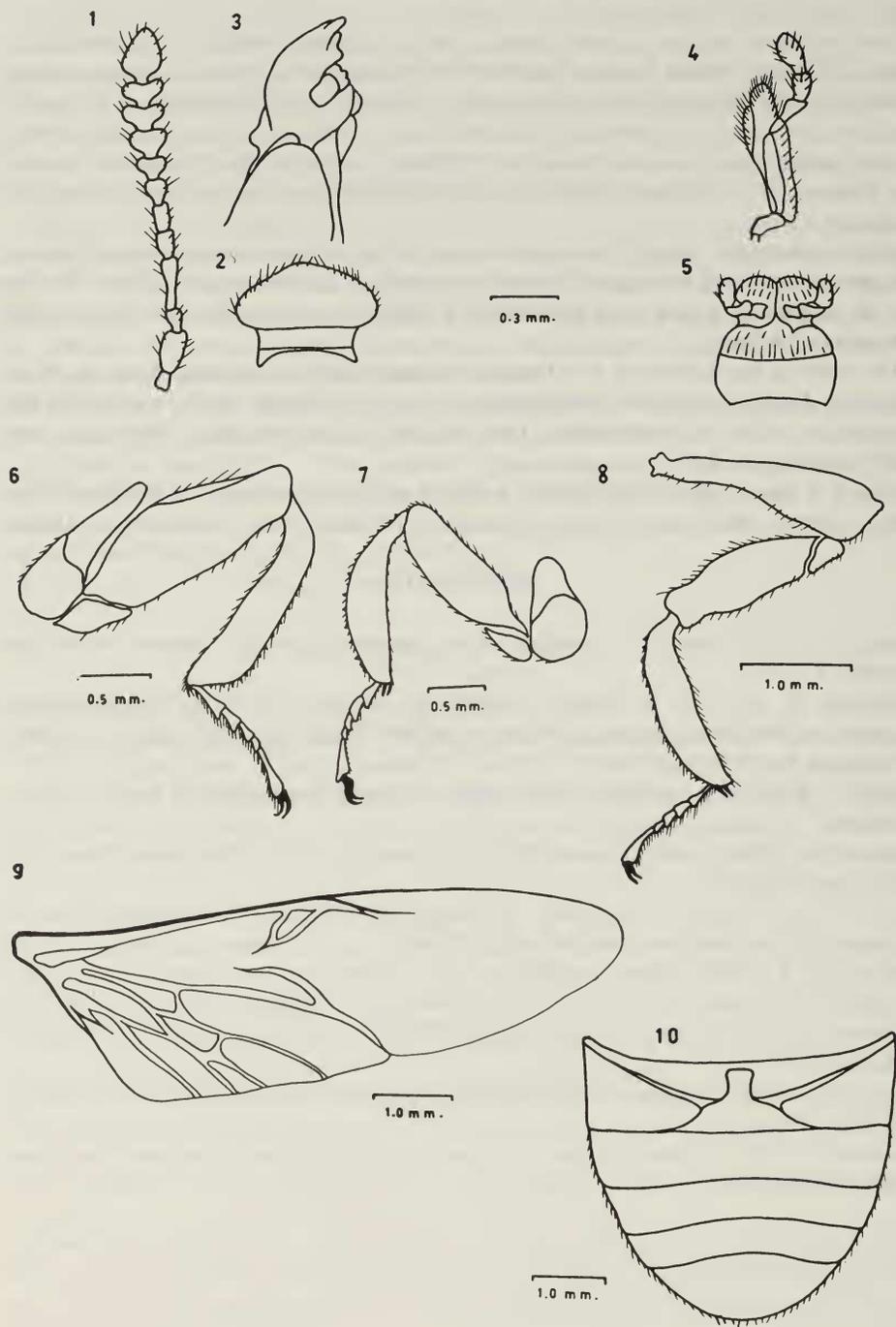


Fig. 1-10. *Byrrhus fasciatus*. 1. Antenna. 2. Labrum. 3. Mandible. 4. Maxilla. 5. Labium. 6. Fore-leg. 7. Mid-leg. 8. Hind-leg. 9. Wing venation. 10. Abdominal sternum.

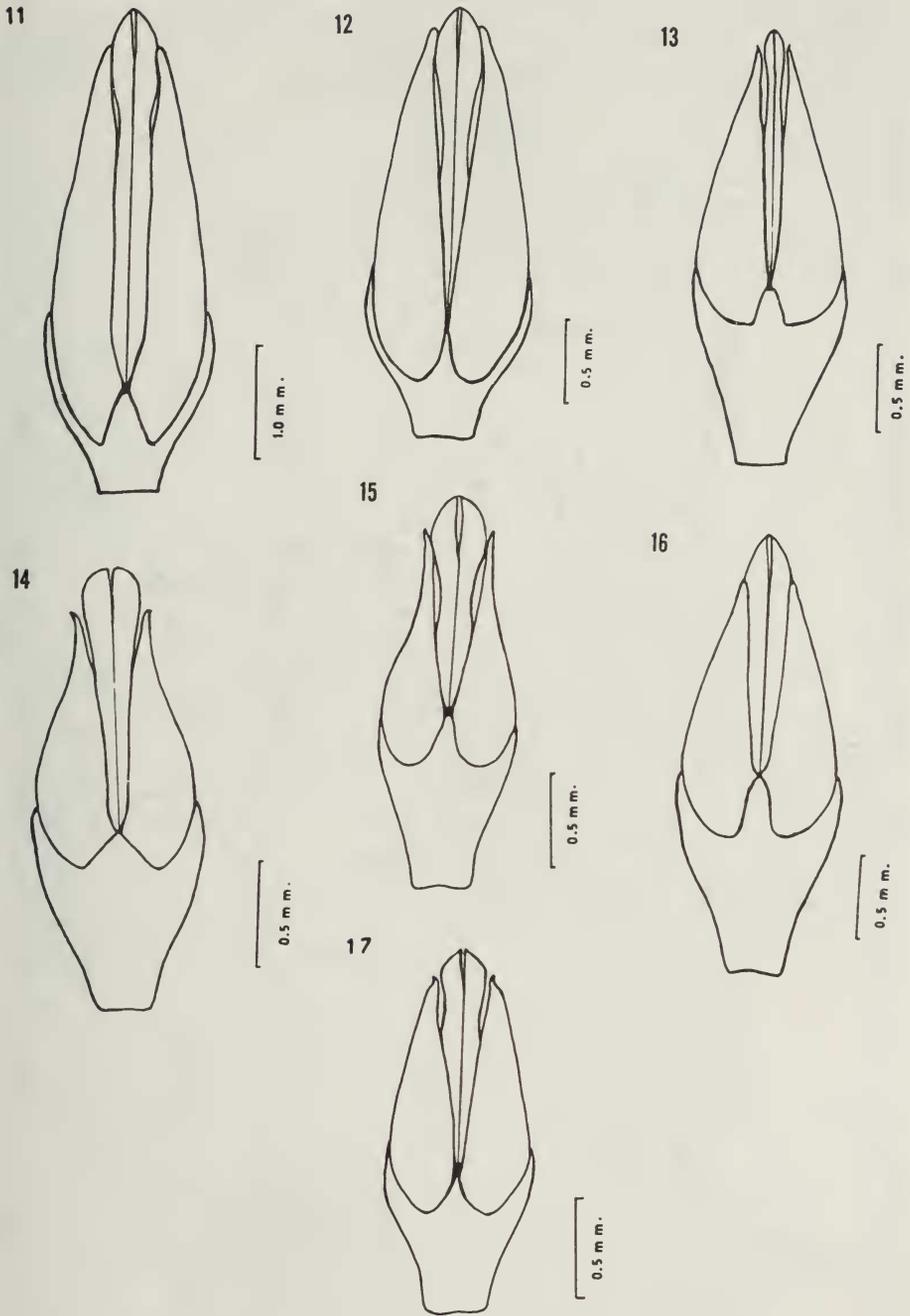


Fig. 11–17. Male genitalia. 11. *Byrrhus americanus*. 12. *B. cyclophorus*. 13. *B. geminatus*. 14. *B. fasciatus*. 15. *B. eximius*. 16. *B. kirbyi*. 17. *B. concolor*.

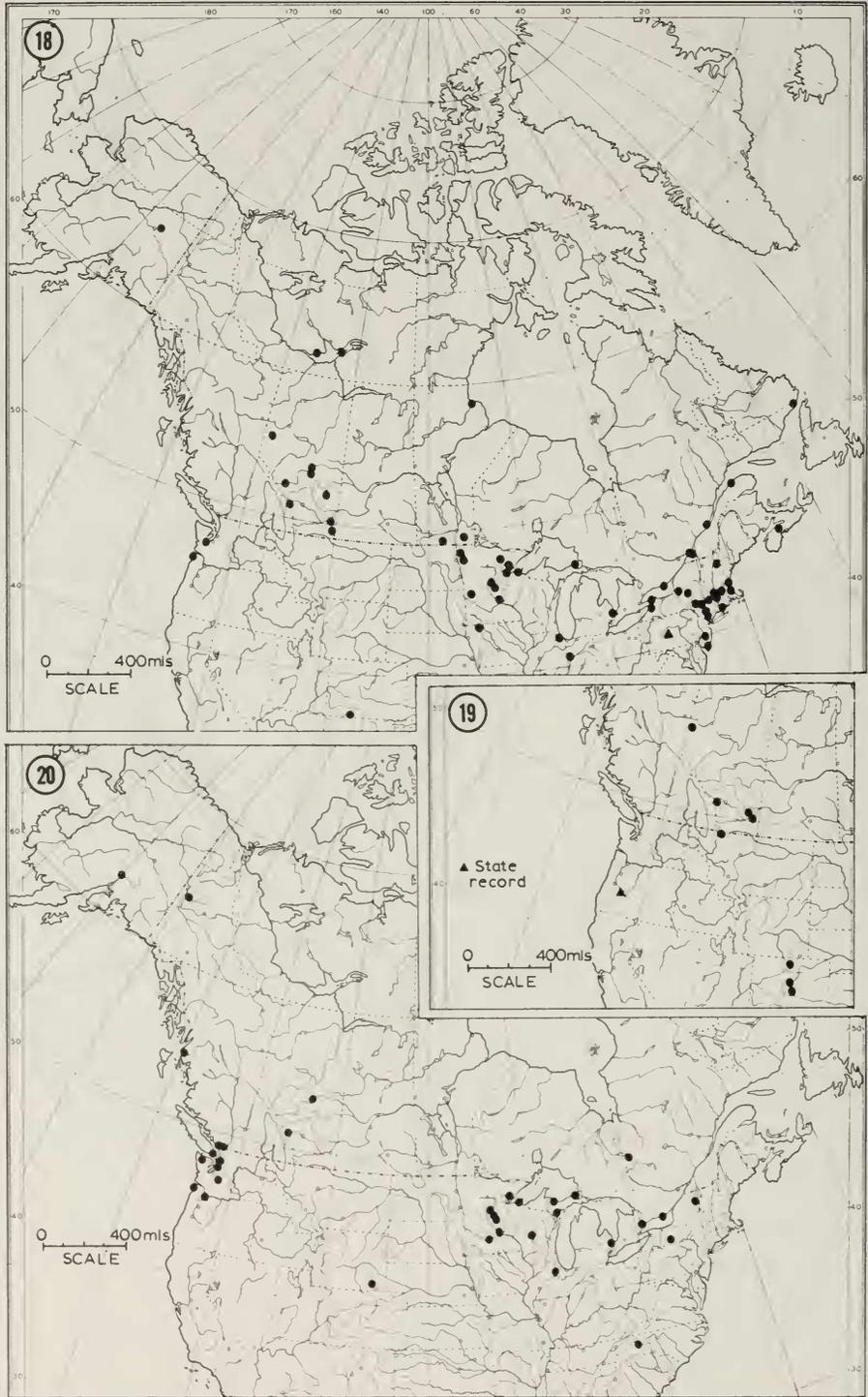


Fig. 18–20. Maps of northern and western North America, illustrating the geographical distribution of *Byrrhus americanus* (18), *Byrrhus cyclophorus* (19), and *Byrrhus geminatus* (20). Filled-in circles – localities; triangles – state records.

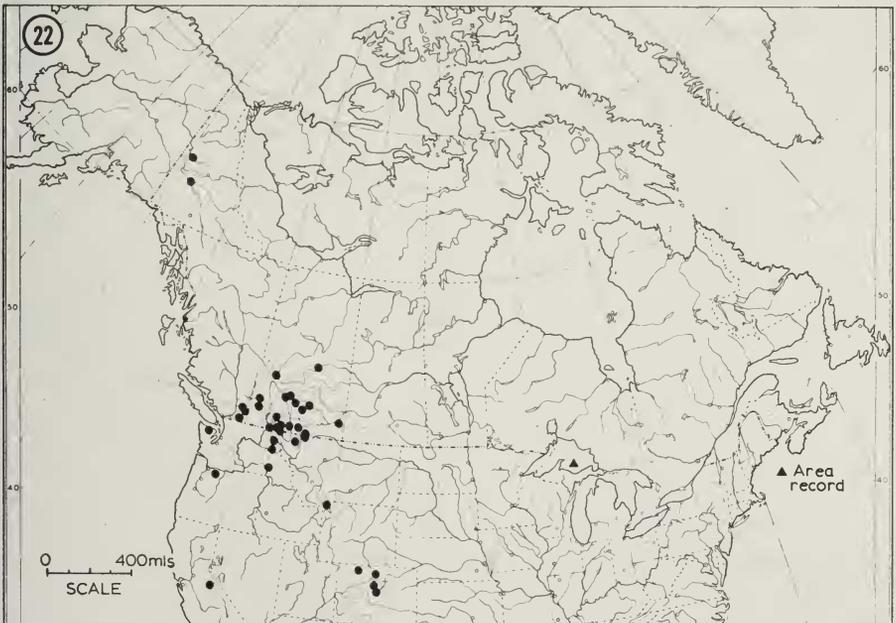


Fig. 21–22. Maps of northern North America, illustrating the geographical distribution of *Byrrhus fasciatus* (21) and *Byrrhus eximius* (22). Filled-in circles – localities; triangle – area record.

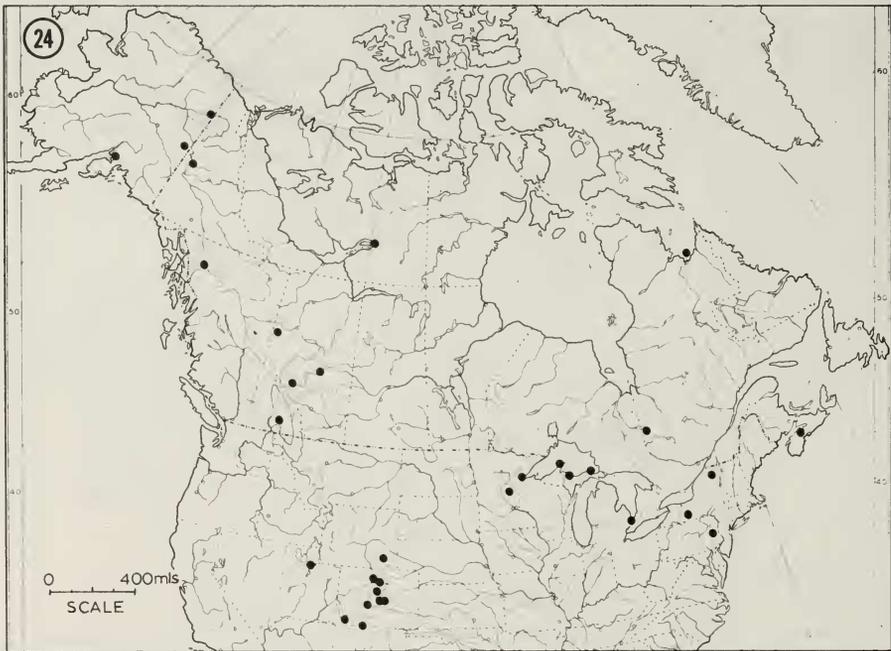
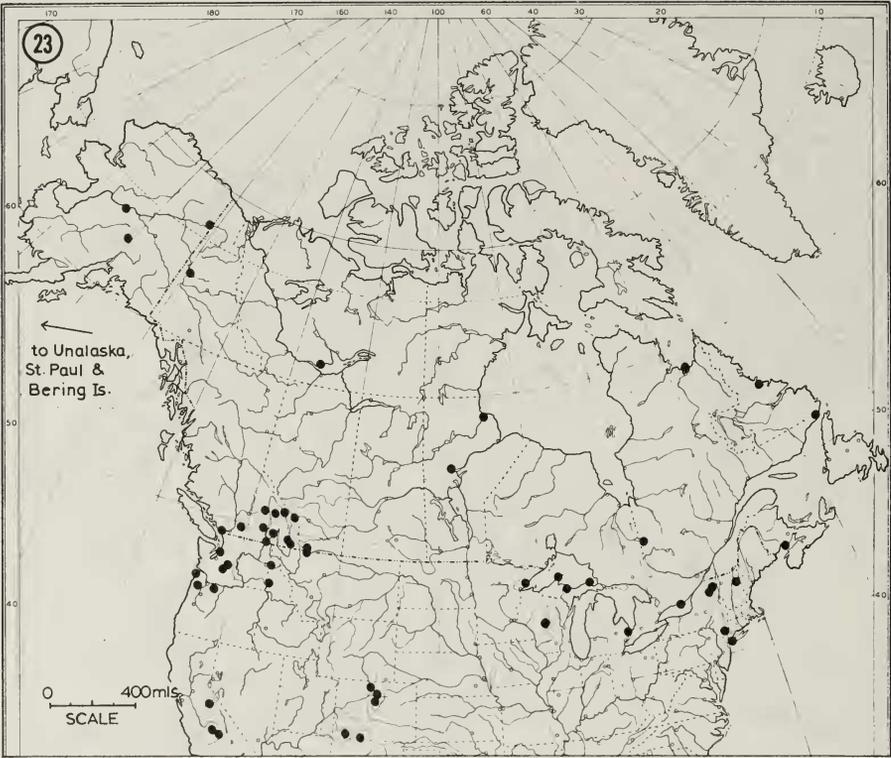


Fig. 23—24. Maps of northern North America, illustrating the geographical distribution of *Byrrhus kirbyi* (23) and *Byrrhus concolor* (24).